REG-1302
Revision 0

Independent Qualified Registered Professional Engineer Design Assessment Report For Integrated Disposal Facility (IDF) Leachate Transfer Pipeline

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract 89303320DEM000030

P.O. Box 1464
Richland, Washington 99352

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Independent Qualified Registered Professional Engineer Design Assessment Report For Integrated Disposal Facility (IDF) Leachate Transfer Pipeline

Program/Project: IDF

A. A. Marshall
Central Plateau Cleanup Company LLC (CPCC)

Date Published
December 2020

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Cleanup Company

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Independent Qualified Registered Professional Engineer
Design Assessment Report
For
Integrated Disposal Facility (IDF) Leachate Transfer Pipeline

IQRPE Design Assessment Report
No. DA-332610-01
Rev. 0

Prepared By

Meier
ARCHITECTURE • ENGINEERING

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At the request of:

DGR GRANT CONSTRUCTION
Richland, Washington 99352

For:

CH2MHILL
Plateau Remediation Company

Meier Project No. 20-8692
DGR Grant Construction Contract No. 332610
CHPRC Contract No. 72435

December 9, 2020

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1.0 INTRODUCTION

The Washington Administrative Code (WAC) 173-303, *Dangerous Waste Regulations*, provides a set of requirements for owner/operators of dangerous waste tank systems. This Design Assessment Report is prepared for DGR Grant Construction for CH2MHILL Plateau Remediation Company (CHPRC), by an Independent Qualified Registered Professional Engineer (IQRPE) to certify that the proposed tank system will have sufficient structural integrity and is acceptable for storing and treating dangerous waste per WAC 173-303-640(3), *Design and Installation of New Tank Systems or Components*. The scope of this task involves the addition of a new high density polyethylene (HDPE) underground transfer pipeline for leachate transfer between the two leachate transfer buildings.

IP-332610-01, *IQRPE Inspection Plan for Integrated Disposal Facility (IDF) Infrastructure Upgrades*, identifies the IQRPE inspections required for procurement, fabrication, testing, and installation of the underground transfer pipeline associated with the IDF Infrastructure Upgrades Project.

IA-332610-01, *IQRPE Installation Assessment Report for Integrated Disposal Facility (IDF) Leachate Transfer Pipeline*, will be prepared for DGR by an IQRPE to certify that the tank system installations are in accordance with WAC 173-303-640(3)(c)-(g).

The IQRPE maintains "independence" at all times. However, comments by others are considered by the IQRPE during the preparation of reports and plans. Only the IQRPE can implement changes to the master IQRPE documents.

1.1 PROJECT DESCRIPTION

1.1.1 Background

The scope of this work is to prepare the IDF Facility for the disposal of Immobilized Low Level Waste (ILAW) from the Waste Treatment Plant (WTP). Additionally, the IDF will receive low-level waste and mixed low-level waste from various Hanford site operations.

The new leachate transfer pipeline system is included as part of a tank system under WAC 173-303-640(3). For new tank systems and components, an integrity assessment must be performed to conform to the requirements found in WAC-173-303-640(3) certified by an IQRPE in accordance with WAC-173-303-810(13)(a).

A new HDPE encased transfer line, 219-3"-LT-052-HDPE, will be installed to connect the two (2) landfill cells via the two (2) Leachate Transfer Buildings to both leachate tanks, allowing for transfer leachate to either of the two (2) tanks. Four (4) leachate transfer sumps will be located along the new transfer line to provide leak detection.

This activity constitutes a design modification to an existing facility. In accordance with WAC-173-303-640(3)(a), modification of an existing facility requires that the IQRPE attest that the modifications will not impact the structural integrity of the component and is acceptable for handling dangerous waste.

1.1.2 IQRPE Scope

Meier Architecture • Engineering (Meier) is the IQRPE of record for the IQRPE Support for the IDF Leachate Transfer Pipeline. Meier will provide IQRPEs and Independent Qualified Installation Inspectors (IQIIs) to review the design, fabrication, and installation activities involving the IDF Leachate Transfer Pipeline per Statement of Work (SOW) for Construction Requisition No. 00332610, *IDF Infrastructure Upgrades – Leachate Tank Domes*.

A review of design documents (drawings, calculations, specifications, Engineering Change Requests [ECR], etc.) was completed by the IQRPE. Included within the scope of the IQRPE review are various technical evaluations covering areas dealing with potential waste leak paths, thermal expansion, water hammer, and freeze protection issues associated with the IDF Leachate Transfer Pipeline.

The IQRPE performed the design assessment to the requirements of WAC 173-303-640(3). The scope of the IQRPE assessment will include the evaluation of the new piping and equipment to support the operation of the IDF Leachate Transfer Pipeline:

- Leachate transfer line (TL) 219-3”-LT-052-HDPE (ECR-18-001801, *IDF Leachate Tank 219A201 and 219E201 Connection*, pages 10 and 11).
- Leachate transfer sumps (LTS) (ECR-18-001801, pages 10, 11 and 12):
  - LTS-1
  - LTS-2
  - LTS-3
  - LTS-4

The overall design details for the IDF Leachate Transfer Pipeline are documented in CHPRC-03789, *Functional Design Criteria Integrated Disposal Facility Infrastructure*; CHPRC-03953, *Integrated Disposal Facility (IDF) Infrastructure Construction Specification*; and ECR-18-001801. The IDF Leachate Transfer Pipeline will be connected to existing IDF piping. The original construction specification is RPP-18489, *Integrated Disposal Facility (IDF) Detailed Design: Technical Specifications Final Design Submittal*.

This IQRPE design assessment takes credit for previously issued IQRPE Integrity Assessment Reports for the existing IDF Leachate Tank Systems detailed in RPP-RPT-25837, *IQRPE Design Assessment Report, Cell 1*, and in RPP-RPT-27414, *IQRPE Design Assessment Report, Cell 2*.

The installed location of the IDF Leachate Transfer Pipeline is located on the Hanford Nuclear Waste Site in the 200 East Area.

The following figures show the general layout of the project location, infrastructure, equipment layout, and other pertinent details.

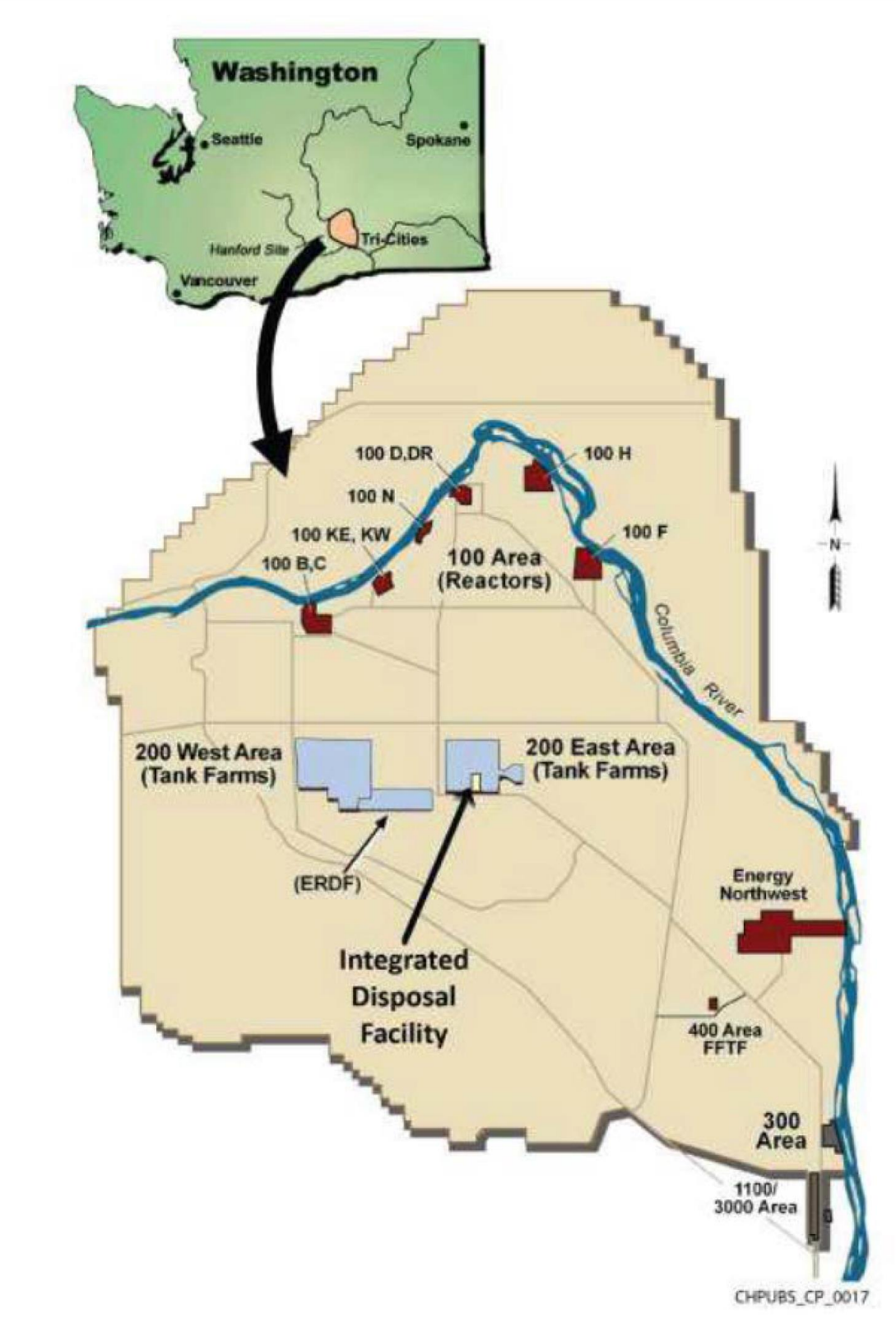

Figure 1: Location of Integrated Disposal Facility on the Hanford Site (CHPRC-03789)

Figure 2: Early Aerial View of Integrated Disposal Facility (CHPRC-03789)

Figure 3: Current Aerial View of Integrated Disposal Facility (Washington River Protection Solutions, Issue 553, Dec. 1, 2020)

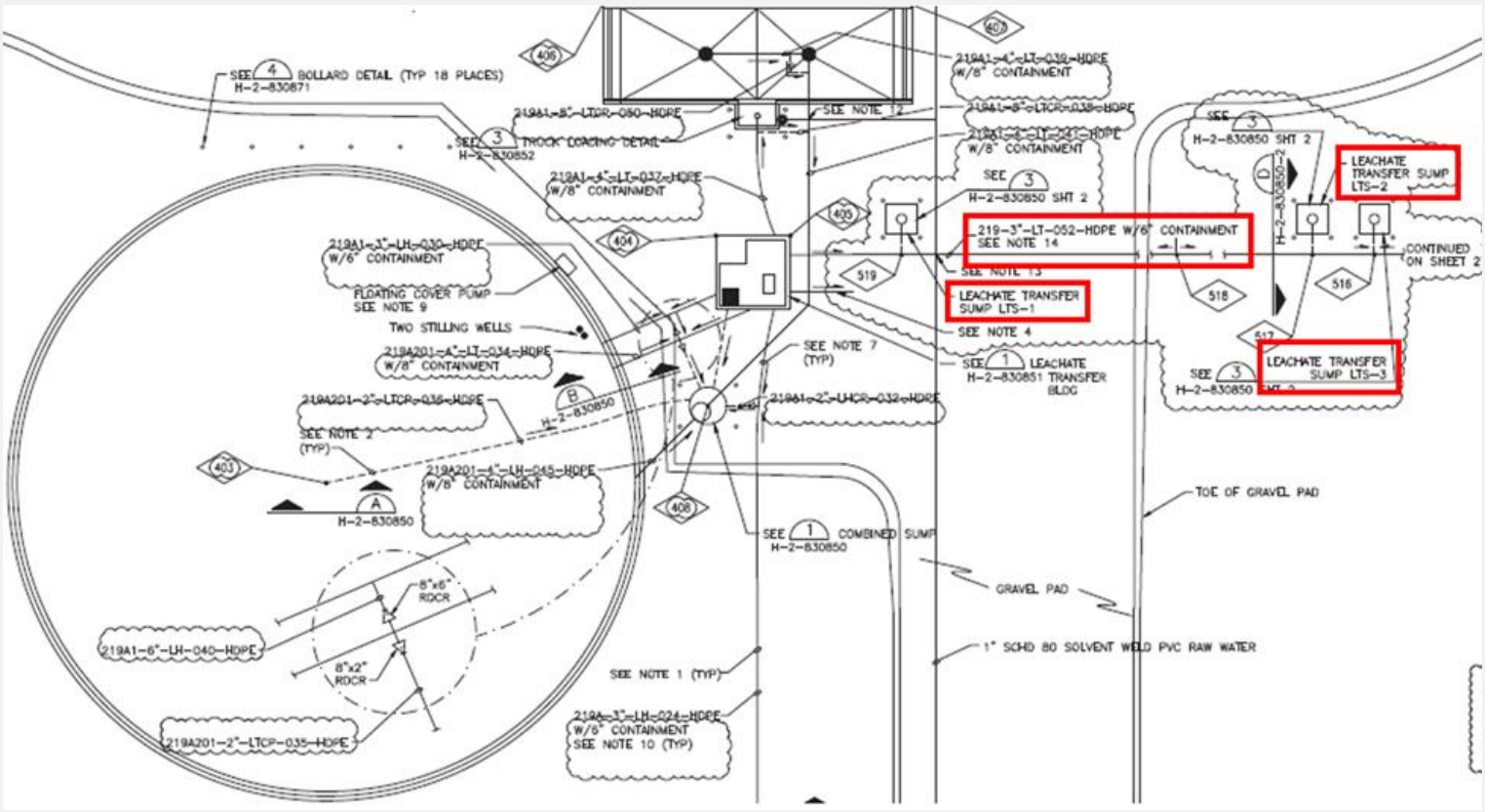

Figure 4: Leachate Transfer Line and Sump Locations (Drawing: ECR-18-001801, Page 10)

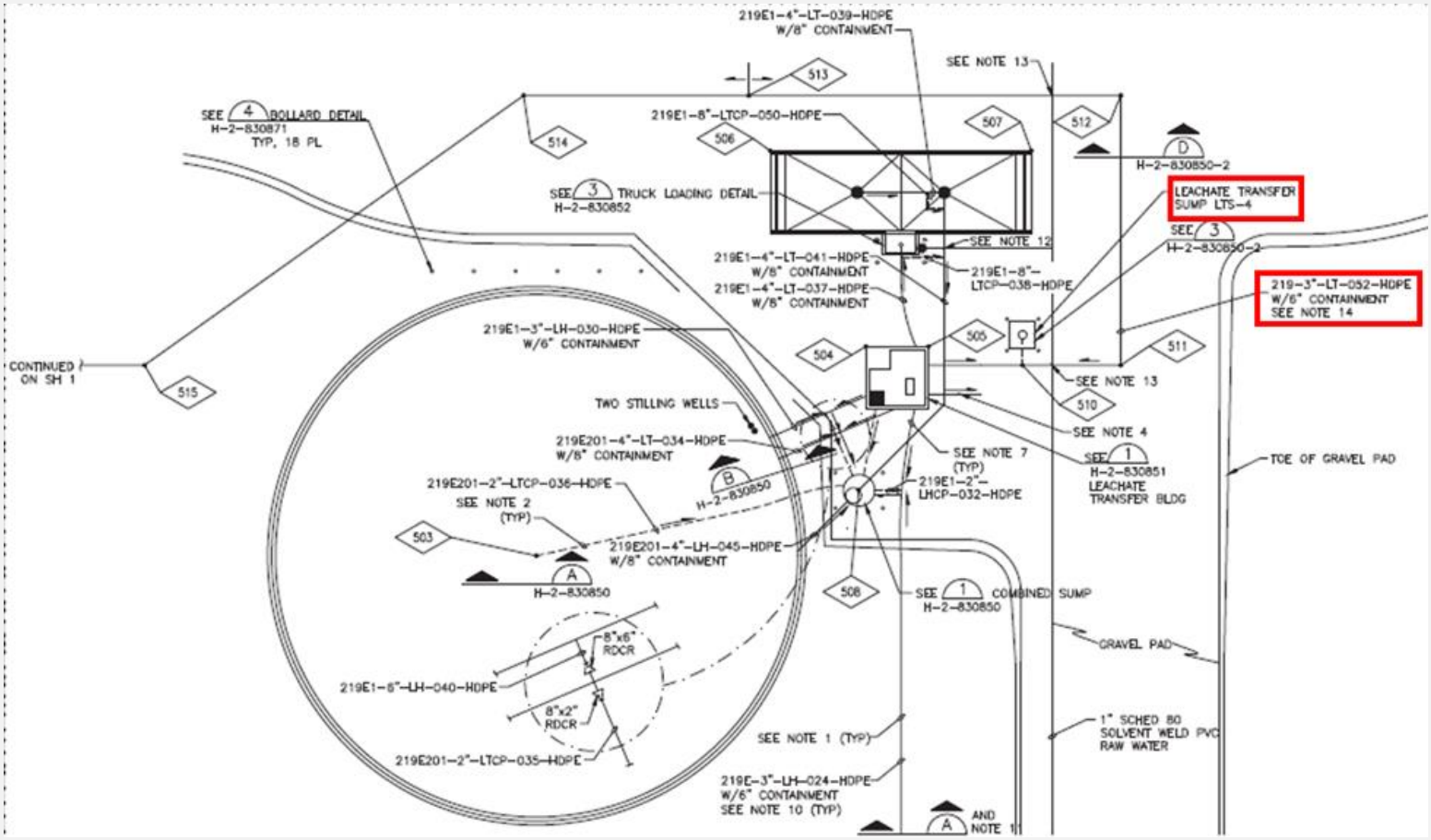

Figure 5: Leachate Transfer Line and Sump Locations (Drawing: ECR-18-001801, Page 11)

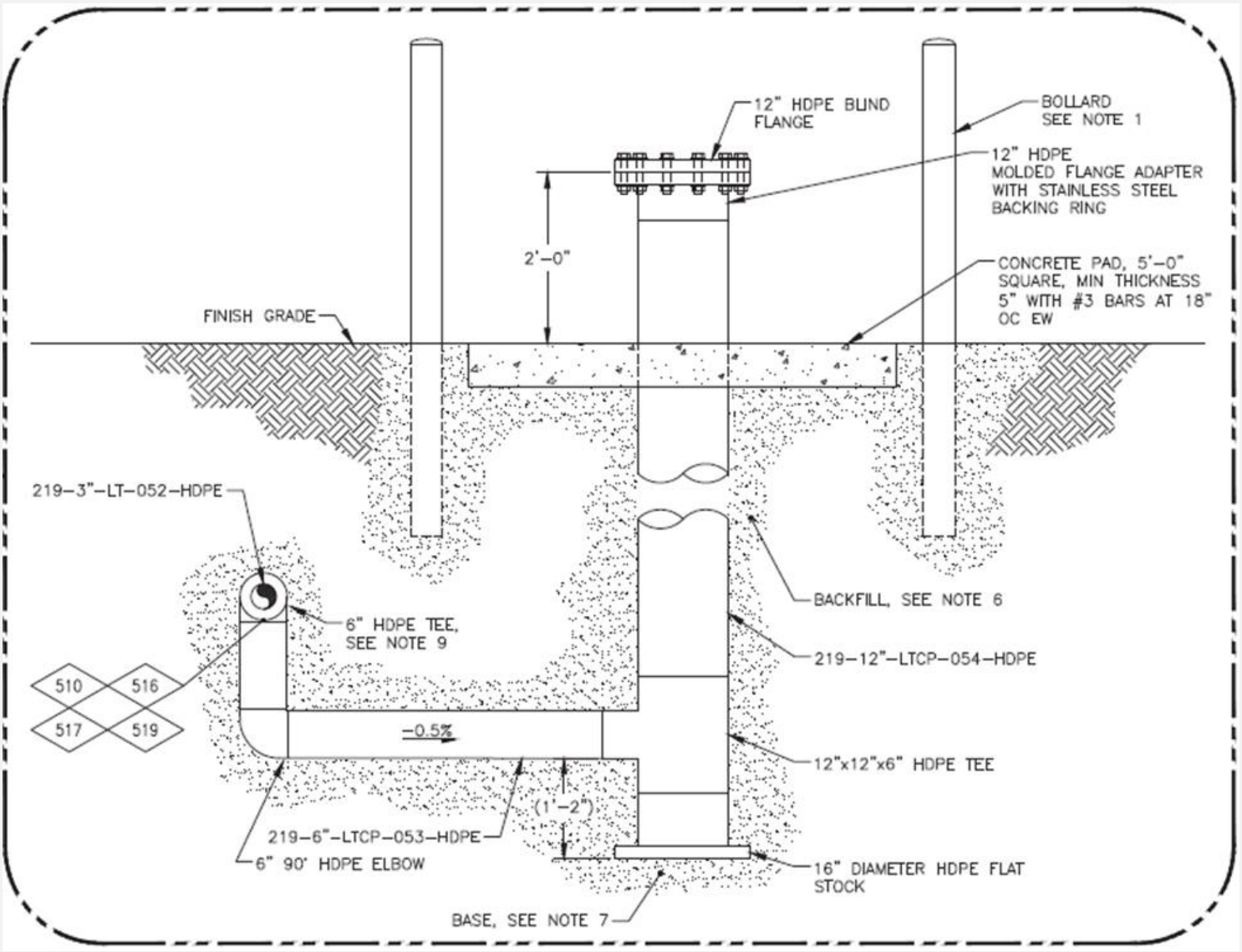

Figure 6: Leachate Transfer Line Sump Detail (Drawing: ECR-18-001801, Page 12)

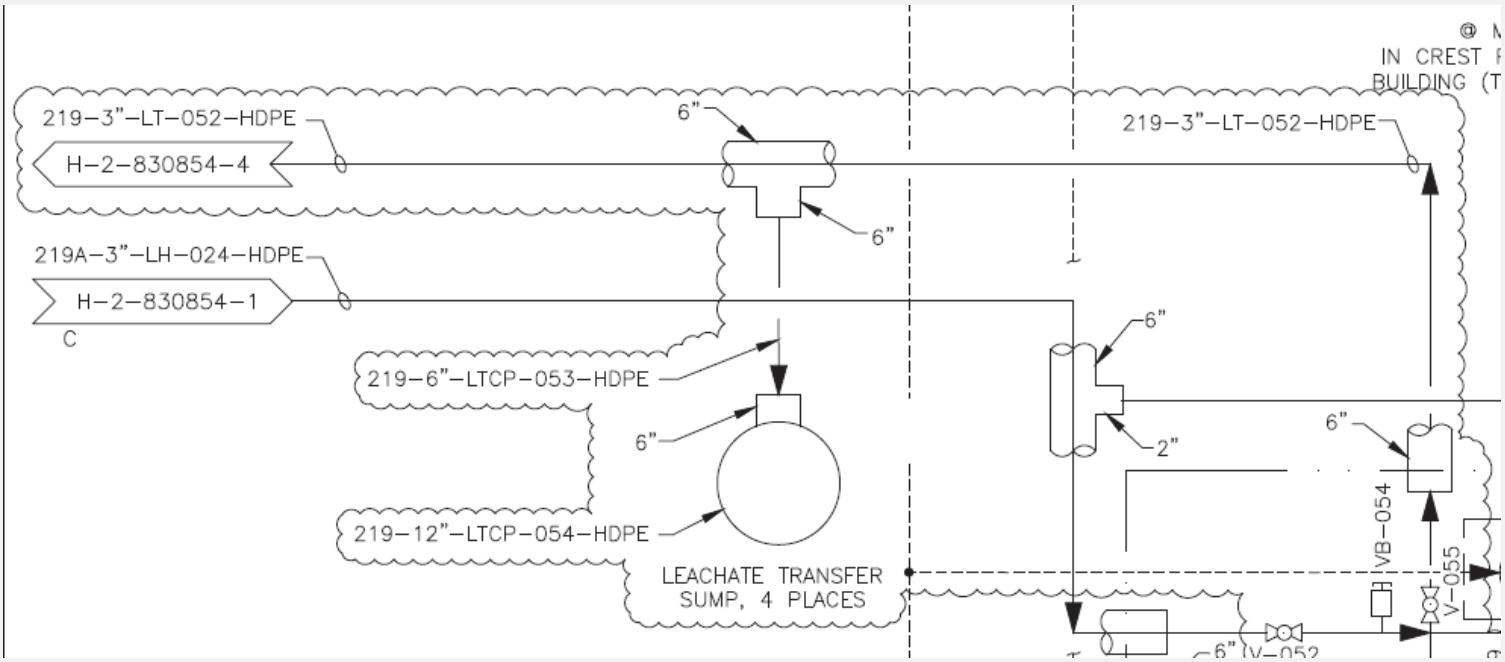

Figure 7: P&ID (Drawing: ECR-18-001801, Page 18)

1.2 DESIGN REVIEW REQUIREMENTS

Many of the components required for the transfer of dangerous or mixed waste are regulated by WAC 173-303-640(3) requirements. WAC codes require an IQRPE's review of the design of these components prior to installation.

As a basis for the IQRPE certification, a review is performed on a final version of the document design package as prepared and reviewed by CHPRC. Documents such as drawings, calculations, Engineering Change Requests (ECRs), Engineering Design Transmittals (EDTs), Technical Evaluations, and specifications included in the design review package that are marked as final, and have signatures of the preparer, checker, and approver are reviewed by the IQRPE as a completed document. All other documents will be reviewed as preliminary or supportive information.

The IQRPE maintains "independence" at all times. Comments by others are considered by the IQRPE during the preparation of reports and plans. Only the IQRPE can implement changes to the master IQRPE documents.

1.3 DESIGN OVERVIEW FOR IDF LEACHATE TRANSFER PIPELINE

This IQRPE Design Assessment Report is prepared for DGR and CHPRC by an IQRPE to certify that the proposed tank system will have sufficient structural integrity and is acceptable for storing and treating dangerous waste per WAC 173-303-640(3)(a).

The components within the scope of this IQRPE design assessment for the IDF Leachate Transfer Pipeline include only those that either will be, or have the potential to be, in direct contact with waste fluids. The piping installed for the IDF Leachate Transfer Pipeline is required to comply with CHPRC-03953.

The IDF Infrastructure Upgrades Project components included in this design review include.

- Leachate transfer line 219-3”-LT-052-HDPE
- Leachate transfer sumps:
  - LTS-1
  - LTS-2
  - LTS-3
  - LTS-4

1.4 SCOPE OF IQRPE DESIGN ASSESSMENT

This IQRPE design assessment includes a comprehensive review of the design package per WAC 173-303-640(3).

1.4.1 Portions of the IDF Leachate Transfer Pipeline Included in Scope for IQRPE Certification

Documents included in this design review for the IDF Leachate Transfer Pipeline include:

- Procurement Information
- Construction Specifications
- Technical Specifications
- Design and Fabrication Drawings
- ECRs
- Piping and Instrumentation Drawings (P&IDs)

A list of documents reviewed by the IQRPE as part of this Design Assessment Report is included in Section 4.0.

1.4.2 Portions of the IDF Leachate Transfer Pipeline Not Included in Scope for IQRPE Certification

This IQRPE design assessment was limited only to IDF Leachate Transfer Pip**e**line components that either will be, or have the potential to be, in contact with waste. Components that are not within the scope of this IQRPE design assessment include those that will not be in direct contact with waste fluids, with the exception of those components that are being relied upon to provide protection to other components that do contain waste.

2.0 ASSESSMENT SUMMARY

Systems within the IQRPE scope of this assessment (Section 1.4.1) are adequately designed to prevent failure caused by corrosion or by structural loads imposed by the system’s intended service. These conditions are described in more detail below. The system design complies with the applicable requirements of WAC 173-303-640(3). Design documents that were reviewed as part of this assessment are referenced in Section 4.0.

2.1 CODES, STANDARDS, AND REGULATIONS

The codes, standards, and regulations specifically used during the preparation of this certification are referenced, as necessary, throughout this report. A complete list of applicable references is contained in Section 4.0.

2.2 BASIS OF DESIGN

The design details associated with IDF Leachate Transfer Pipeline components are presented in subsequent sections.

2.2.1 Structural Design Standards

WAC 173-303-640(3) requires that an IQRPE certify that the proposed tank system will have sufficient structural integrity and is acceptable for storing and treating dangerous waste. This assessment must show, in accordance with WAC 173-303-640(3)(a), that the foundation, structural support, seams, connections, and pressure controls are adequately designed and that the tank system has sufficient structural strength, compatibility with the waste to be stored and treated, and corrosion protection to ensure that it will not collapse, rupture, or fail.

WAC 173-303 define backfill requirements to provide structural support to prevent excessive settlement and corrosion.

The IDF Leachate Transfer Pipeline involves the installation of a pipeline and four (4) sumps. The design details for these components are depicted in ECR-18-001801. Structural concerns related to traffic impacts, freeze protection of piping, frost heaving of foundations, and back fill requirements to provide structural support to prevent excessive settlement and corrosion were evaluated.

2.2.1.1 Leachate transfer line 219-3”-LT-052-HDPE

The 6” HDPE pipe was analyzed in accordance with the methodology presented in the *Handbook of Polyethylene Pipe* to confirm that the pipe is adequately designed to limit deflection, compressive stress, and constrained buckling when subjected to soil loading and the transfer building surcharge or wheel loads from an AASHTO HS20-44 truck load. The internal pressure from the leachate fluid was also evaluated per the methodology in the *Handbook of Polyethylene Pipe*. The leachate transfer lines installed per ECR-18-001801 were determined to be structurally adequate for the predicted soil pressure, leachate fluid pressure, traffic, and surcharge loads (CHPRC-03955, *IDF Infrastructure Design Calculation: Leachate Pipe Loading Calculation*). Excavation and backfill requirements for the pipeline are specified in CHPRC-03953, *Integrated Disposal Facility (IDF) Infrastructure Construction Specification*).

The pipeline is sloped at 0.5%, which prevents it from trapping liquid, and has a minimum of 3’ 6” of soil cover over its top which serves to protect it from freezing temperatures (ECR-18-001801, Page 12 and CHPRC-03953, Section 33 05 33.23 – 3.3 S).

2.2.1.2 Leachate Transfer Sumps

The HDPE manholes are analyzed in CHPRC-03955 to confirm that the manholes are adequate to resist soil pressure, live loads, and dead loads against ring compressive thrust, ring bending, combined ring strain, ring and axial buckling, and axial strain. The transfer sumps installed per ECR-18-001801 were determined to be structurally adequate for the predicted soil pressure, leachate fluid pressure, traffic, and surcharge loads (CHPRC-03955). The excavation and backfill requirements for the sumps are specified in CHPRC-03953. The above ground portions of the transfer sumps have bollards installed around them to protect them from traffic impacts (ECR-18-001801, Page 12).

2.2.1.3 Structural Design Exceptions

Based on the above information, there are no IQRPE certification exceptions to the structural design standards review of the piping materials and sumps used for the IDF Leachate Transfer Pipeline.

2.2.1.4 Structural Design Conclusion

The IQRPE concurs that this design basis meets the requirements of WAC 173-303-640(3)(a).

2.2.2 Waste Compatibility

Regulations located in WAC 173-303-640(3)(a) require tank systems be compatible with the wastes transported or otherwise handled. The piping and sump materials of the IDF Leachate Transfer Pipeline meet the requirements of CHPRC-03953. Component materials that either will be in contact with tank waste or have the possibility of coming into contact are summarized in Table 1 below.

Table 1: IDF Leachate Transfer Pipeline Materials of Construction

Item	Drawing Location	Description	Item #	Component Materials / Notes
IDF Leachate Transfer Pipeline	ECR-18-001801 and CHPRC-03953	3” Primary Piping	--	ASTM D3350 (Piping & Fittings)
		6” Encasement Piping	--	ASTM D3350 (Piping & Fittings)
Leachate transfer sumps	ECR-18-001801 and CHPRC-03953	12” HDPE Blind Flange	--	ASTM D3350
		12” HDPE Molded Flange adapter with SST	--	ASTM D3350

Item	Drawing Location	Description	Item #	Component Materials / Notes
		backing ring		
		12” HDPE Pipe		ASTM D3350
		12”x12”x 6” HDPE Tee	--	ASTM D3350
		16” Dia. HDPE Flat Stock	--	ASTM D3350

Pipe and fitting materials in contact with waste are HDPE. Based on waste processing experience at Hanford, all metallic and nonmetallic materials in contact with waste are adequate for service.

2.2.3 Anticipated Chemistry and Controls

Information on the composition of the various IDF waste streams can be found in documents RPP-RPT-25837 and RPP-RPT-27414.

2.2.3.1 Waste Compatibility Exceptions

Based on the above review, there are no IQRPE certification exceptions to the anticipated waste compatibility or corrosion issues with the piping materials used for the IDF Leachate Transfer Pipeline that may come into contact with the liquid waste stream.

2.2.3.2 Waste Compatibility Conclusion

The IQRPE concurs that this design basis meets the requirements of WAC 173-303-640(3)(a).

2.2.4 Pressure Control System

WAC 173-303-640(3)(a) requires that an IQRPE certify that the proposed tank system has been designed with appropriate pressure control systems. The components of the IDF Leachate Transfer Pipeline were evaluated for pressure control issues. Both the primary and containment piping of transfer line 219-3”-LT-052-HDPE, and the four (4) sumps, are designed, fabricated, installed, inspected, and tested in accordance with CHPRC-03953 and ECR-18-001801.

2.2.4.1 Leachate transfer line 219-3”-LT-052-HDPE

Calculation CHPRC-03956, *IDF Infrastructure Design Calculation: Leachate Hydraulic Calculation*, was used to determine the anticipated line pressure(s) and flow rate(s) of new leachate transfer line 219-3”-LT-052-HDPE used for transfer of leachate between the IDF cells and/or leachate collection tanks.

The new transfer line will enable leachate to be transferred from one leachate cell sump to the opposing cell's leachate tank at a flow rate of approximately 138 gal/min. It will also enable leachate to be transferred from one (1) leachate tank to the other at a flow rate of approximately 95 gal/min. In both instances, the calculated minimum system pressure of 14.4 psia for the lines is greater than the vapor pressure of water at 93 °F; the maximum static pressure for each of the lines will be below the test pressure of the lines during the transfers. Cavitation will not occur in either of the lines and the piping was determined to be adequate to support the leachate transfer activities as designed and installed (CHPRC-03956).

Section 33 06 05 of CHPRC-03953 specifies the test pressures for both the primary and containment piping of transfer line 219-3"-LT-052-HDPE W/6":

- The 3" primary piping is tested to a hydrostatic test pressure of 75 psi
- The 6" containment piping is tested to a pneumatic test pressure of 8 psi

2.2.4.2 Leachate Transfer Sumps

The sumps are interconnected with the 6" containment piping and are tested to a pneumatic test pressure of 8 psi in conjunction with the containment piping (ECR-18-001801, Page 12).

2.2.4.3 Pressure Control System Exceptions

Based on the above review, there are no IQRPE certification exceptions to the pressure control system review.

2.2.4.4 Pressure Control System Assessment Conclusion

The IQRPE concurs that the IDF Leachate Transfer Pipeline design meets the requirements of WAC 173-303-640(3)(a).

2.2.5 Secondary Containment System

WAC 173-303-640 requires that an IQRPE certify that the proposed tank system has been designed with an appropriate secondary containment system. Secondary containment for tank systems that store, accumulate, or treat dangerous waste must be designed and installed to meet the requirements of WAC 173-303-640(4)(b). Secondary containment for the IDF Leachate Transfer Pipeline is the integral 6" encasement pipe which is also connected to the sump riser pipe.

2.2.5.1 Secondary Containment System Exceptions

Due to the fact that secondary containment was already incorporated into the IDF Leachate Transfer Pipeline by virtue of its design, there are no exceptions to the IQRPE certification of the secondary containment review assessment.

2.2.5.2 Secondary Containment System Assessment Conclusion

The IQRPE concurs that this design basis for the IDF Leachate Transfer Pipeline meets the requirements of WAC 173-303-640(4)(b).

2.2.6 Ancillary Equipment Design

WAC 173-303-640(3) requires that an IQRPE certify that the proposed tank system has been designed with appropriate ancillary equipment in accordance with the requirements of WAC 173-303-640(3)(f) and (4)(f). WAC 173-303-040, *Definitions*, defines "Ancillary Equipment" as any device including, but not limited to, such devices as piping, fittings, flanges, valves, and pumps, that is used to distribute, meter, or control the flow of dangerous waste from its point of generation to a storage or treatment tank(s), between dangerous waste storage and treatment tanks to a point of disposal on-site, or to a point of shipment for disposal off-site. A review of the ancillary equipment design is normally part of the IQRPE review. The scope of this review includes components listed as in-scope in Section1.4.1 and as described in the review sections above. Piping, fittings, flanges, valves, and pumps have been evaluated by the IQRPE throughout this report, which includes all ancillary equipment in-scope for this design assessment. No other ancillary equipment was identified.

2.2.6.1 Ancillary Equipment System Exceptions

There are no exceptions to the IQRPE certification of the ancillary equipment review assessment.

2.2.6.2 Ancillary Equipment System Assessment Conclusion

The IQRPE concurs that this design basis meets the requirements of WAC 173-303-640(3).

2.2.7 P&ID Review

The P&ID details for the IDF Leachate Transfer Pipeline are depicted on drawings H-2-830854, Sheets 1-2, *IDF Cell #1 P&ID* and H-2-830854, Sheets 3-4, *IDF Cell #2 P&ID*; and as modified by ECR-18-001801.

The IQRPE concludes that the appropriate P&ID review has been made.

2.2.8 Corrosion Assessment

WAC 173-303-640(3) requires an IQRPE corrosion assessment of only the external portion of the primary containment that is in direct contact with soil or water.

The components of the IDF Leachate Transfer Pipeline in contact with soil and water are made of HDPE and thus will not be subject to any corrosion.

The IQRPE concludes that appropriate corrosion considerations have been made.

2.2.8.1 Corrosion Assessment Exceptions

Based on the above requirements, there are no IQRPE certification exceptions to the corrosion assessment review with the materials for the IDF Leachate Transfer Pipeline.

2.2.8.2 Corrosion Assessment Conclusion

The IQRPE concurs that this design basis for the IDF Leachate Transfer Pipeline meets the requirements of WAC 173-303-640(3).

2.2.9 Recommended Inspection Schedule

Inspections completed for the initial installation are described in IA-332610-01. Per the requirements of WAC 173-303-640(3)(c), the Installation Assessment Report provides Inspection Reports documenting installation and any modifications applicable to this design assessment.

Per the requirements of WAC 173-303-640(2)(e), "a schedule for conducting integrity assessments over the life of the tank to ensure that the tank retains its structural integrity and will not collapse, rupture, or fail. The schedule must be based on the results of past integrity assessments, age of the tank system, materials of construction, characteristics of the waste, and any other relevant factors."

The new equipment installed under this document for the IDF Leachate Transfer Pipeline includes:

- Leachate transfer line 219-3"-LT-052-HDPE
- Leachate transfer sumps:
  - LTS-1
  - LTS-2
  - LTS-3
  - LTS-4

The IDF facility design life is anticipated to be 40 years, based on the operation of the WTP and receipt of ILAW. The site infrastructure and support facilities are expected to remain in use throughout the 40-year design life. The Leachate Collection and Recovery System (LCRS) is expected to remain in use up to an additional 30 years beyond the 40-year design life to allow for post-closure monitoring (CHPRC-03789).

Because these items are new, no prior integrity assessments have been completed. Since these items are expected to be installed in 2020, or later, the age of these elements is new. The materials of construction are compatible with the wastes as detailed in Section 2.2.2 of this report. The characteristics of the wastes is also covered in that section. Additionally, corrosion is evaluated in Section 2.2.8 of this report. To allow time for an integrity assessment, it is recommended that a complete Integrity Assessment Report be completed of the above tank system elements within 15 years after initial installation or first contact with waste, whichever is later. It is anticipated these new elements of the tank system will be evaluated as part of the entire system and will be included in the overall IQRPE Integrity Assessment Report for this system in accordance with the interval for integrity assessment established by the operator for the system, as long as the scheduled integrity assessment falls within the recommended period provided here.

3.0 DESIGN REVIEW ASSESSMENT CERTIFICATIONS

The IDF Leachate Transfer Pipeline, as previously described, has been reviewed by the IQRPE and was assessed to be in compliance with the applicable sections of WAC 173-303-640(3). These results are based on a review of the applicable codes, standards, and documents.

A listing of the IQRPE, Professional Engineers, and other engineers who participated in the preparation of this Design Assessment Report is provided below.

Independent Registered Professional Engineer

Paul M. Giever
- S.E., Structural Engineering, License No. 28084

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- P.E., Mechanical Engineering, License No. 23759

BS Degreed Engineer

Nathaniel R. Weinman
- E.I.T., Mechanical Engineering, Enrollment Number E-118188

The certification below is in accordance with the requirements of WAC 173-303-810(13)(a), *Certification*.

Report Lead IQRPE:

WAC 173-303-810(13)(a)

I certify under penalty of the law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

12/9/2020

Report Reviewed by:

Paul M. Giever

Paul M. Giever, P.E.
Independent Qualified Registered Professional Engineer

December 9, 2020
Date

4.0 REFERENCES

ASTM D3350-14, 2014, *Standard Specification for Polyethylene Plastics Pipe and Fittings Materials*, ASTM International, West Conshohocken, Pennsylvania.

CHPRC-03789, 2019, *Functional Design Criteria Integrated Disposal Facility Infrastructure*, Rev. 2, CH2MHILL Plateau Remediation Company, Richland, Washington.

CHPRC-03953, 2019, *Integrated Disposal Facility (IDF) Infrastructure Construction Specification*, Rev. 0, CH2MHILL Plateau Remediation Company, Richland, Washington.

CHPRC-03955, 2020, *IDF Infrastructure Design Calculation: Leachate Pipe Loading Calculation*, Rev. 1, VNS Federal Services for CH2MHILL Plateau Remediation Company, Richland, Washington.

CHPRC-03956, 2020, *IDF Infrastructure Design Calculation: Leachate Hydraulic Calculation*, Rev. 0, VNS Federal Services for CH2MHILL Plateau Remediation Company, Richland, Washington.

ECR-18-001801, 2020, *IDF Leachate Tank 219A201 and 219E201 Connection*, Rev. 0, Washington River Protection Solutions, LLC, Richland, Washington.

H-2-830854, 2006, Sheets 1-2, *IDF Cell #1 P&ID*, Rev. 0, CH2MHILL Plateau Remediation Company, Richland, Washington.

H-2-830854, 2006, Sheet 3, *IDF Cell #2 P&ID*, Rev. 0, CH2MHILL Plateau Remediation Company, Richland, Washington.

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RPP-RPT-27414, 2006, *IQRPE Design Assessment Report, Cell 2*, Rev. 0, CH2M Hill Hanford, Richland, Washington.

Statement of Work for Construction Requisition No. 00332610, 2020, *IDF Infrastructure Upgrades – Leachate Tank Domes*, Rev. 1, CH2MHILL Plateau Remediation Company, Richland, Washington.

WAC 173-303, *"Dangerous Waste Regulations,"* Washington Administrative Code, as amended.

WAC 173-303-040, *"Definitions"*, Washington Administrative Code, as amended.

WAC 173-303-640(2), *"Assessment of Existing Tank System's Integrity,"* Washington Administrative Code, as amended.

WAC 173-303-640(3), *"Design and Installation of New Tank Systems or Components,"* Washington Administrative Code, as amended.

WAC 173-303-640(4), "*Containment and Detection of Releases,"* Washington Administrative Code, as amended.

WAC 173-303-640, *"Tank Systems,"* Washington Administrative Code, as amended.

WAC 173-303-810(13)(a), *"Certification,"* Washington Administrative Code, as amended.